readings over any convenient range. The other two constants depend on the length of the stoppage at the lowest point of the range, and the relation between the rates of the lowering and the recovery of pressure. The results calculated in this way show a very satisfactory agreement with the Kew verifications.

The investigation being principally intended to increase the usefulness of the existing Kew test, and to show where it is most in need of amplification or amendment, attention is primarily given to the *defects* of aneroids. It is hoped that the increased knowledge of these defects will enable rules to be framed for the rejection of aneroids, and that in this way it will be made worth while for makers to improve the instrument. The large differences brought to light between different aneroids, show that the means of markedly raising the average are already at the makers' disposal if they choose to utilise their knowledge. The present enquiry also shows clearly how the effects of tentative improvements may best be ascertained. The method of utilising aneroids to the best advantage in determining mountain heights is not formally considered, but a variety of the results should nevertheless be found of immediate service by any traveller of intelligence who has this object in view.

"On the Heat dissipated by a Platinum Surface at High Temperatures." By J. E. PETAVEL, 1851 Exhibition Scholar. Communicated by LORD RAYLEIGH, F.R.S. Received May 19,—Read June 9, 1898.

(Abstract.)

The first part of the paper refers to the emissivity of a bright platinum surface in air and in other gases.

The temperature measurements are based on the researches of Callendar and Griffiths, confirmed by the recent determinations of Heycock and Neville. To check the calibration of the thermometers at higher temperatures, the melting point of palladium was used. A number of the curves are extended to 1779° C. by a direct measurement of the emissivity of platinum and palladium at their melting points.

The platinum wire, which served at the same time as radiator and thermometer, was 0·112 cm. in diameter. It was placed in the axis of a vertical glass cylinder, which formed the enclosure.

The effects produced by a change in the size, shape, material, and temperature of the enclosure and in the position and diameter of the wire are also studied.

The temperature is expressed in degrees centigrade, and the emissivity in C.G.S. units.

Emissivity of a Bright Platinum Surface in Air, Carbon Dioxide, Hydrogen, Oxygen, and Steam.

Gas contained in the enclosure	Air.			Carbon dioxide.			Hydrogen.			Oxygen.	Steam.
Pressure in centimetres of mercury	1	76	228	6	76	228	6	76	228	228	76
Temperature in degrees centigrade.											
200	0·00043	0·00079	0·00110	0·000435	0·000803	0·00113	0·00216	0·00290	0·00373	0·00107	
600	0·00081	0·00125	0·00174	0·000820	0·00134	0·001865	0·00308	0·00413	0·00535	0·001755	0·00078
900	0·00117	0·00173	0·00229	0·001295	0·00191	0·00252	0·00385	0·00503	0·00658	0·002335	0·00225
1200	0·00186	0·00247	0·00297	0·00200	0·00264	0·00338	0·00478	0·00604	0·00793	0·003115	0·00320
1779	..	0·00497	..	..	..	..	..	0·00941			

The emissivity is expressed in C.G.S. units. The temperature of the enclosure was kept at about 10° C. The diameter of the radiating wire was 0·112 cm.

An abstract of the values obtained is given in the table (p. 404).

Part II consists of a bolometric study of the radiation emitted by platinum at temperatures ranging from 500° C. to the melting point of the metal. It is shown that for theoretical reasons the true rate of change of the total radiation with temperature lies between the values obtained by measuring the heat lost by the radiating body and those deduced from the readings of any form of bolometer or thermopile.

By comparing the observations of Dr. J. T. Bottomley and Schleiermacher, based on the first method, with those of F. Paschen and of the author, made by the second method, a reliable criterion is obtained by which to test any formula intended to express the law of thermal radiation.

The formulæ of Dulong and Petit, of Stefan, and of Rosetti fail when tested in this manner; whilst Weber's formula, from 400° to 800° C., gives results in close agreement with the true rate of change of total radiation with regard to temperature.

The second part of the paper also contains a description of some points of interest in the design of the bolometer which was used during this work.

Part III refers to the variation of the intrinsic brilliancy of platinum surface with temperature.

The results may be expressed by the following formula:—

$$(t-400) = 889{\cdot}6 \sqrt[6{\cdot}9]{b},$$

where t is the temperature in degrees centigrade, and b the intrinsic brilliancy in candle power per square centimetre. The constant 400 is taken as the temperature limit at which the visible radiation falls to zero.

"On a new Constituent of Atmospheric Air." By WILLIAM RAMSAY, F.R.S., and MORRIS W. TRAVERS. Received June 3—Read June 9, 1898.

This preliminary note is intended to give a very brief account of experiments which have been carried out during the past year to ascertain whether, in addition to nitrogen, oxygen, and argon, there are any gases in air which have escaped observation owing to their being present in very minute quantity. In collaboration with Miss Emily Aston we have found that the nitride of magnesium, resulting from the absorption of nitrogen from atmospheric air, on treatment with water yields only a trace of gas; that gas is hydrogen, and arises from a small quantity of metallic magnesium unconverted into nitride. That the ammonia produced on treatment